1982

ANNUAL REPORT

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SASKATCHEWAN **RESEARCH**
COUNCIL

THE RESEARCH COUNCIL ACT, 1965
Clause 21, in part, directs that:

1. The Council shall on or before the last day of February in each year submit to the Lieutenant Governor in Council a report of its proceedings and transactions during the next preceding calendar year, which report shall contain such particulars as the Lieutenant Governor in Council may prescribe.

2. Every report shall forthwith be laid before the Legislative Assembly if then in session or, if it is not in session, within fifteen days after the opening of the next session.

Regina, February 23, 1983

TO THE HONOURABLE C. McINTOSH

Lieutenant Governor of the
Province of Saskatchewan

MAY IT PLEASE YOUR HONOUR:

The undersigned presents herewith, for your consideration, the report of the Saskatchewan Research Council for the year ended December 31, 1982.

Respectfully submitted,

Jack Sandberg, Chairman
Saskatchewan Research Council

PLEASE ADDRESS CORRESPONDENCE TO:

Saskatchewan Research Council
30 Campus Drive
Saskatoon, Saskatchewan
S7N 0X1

MEMBERS OF THE SASKATCHEWAN RESEARCH COUNCIL

The Honourable Jack Sandberg, Chairman
* D. Patriquin, Vice Chairman
D. Murray (Secretary)
G. Birney
C. Blachford
E.B. Campbell
B.M. Craig
* W. Degelman
A.J.Y. Guy
L. Katz
K.J. McCallum
H.S. Maliepaard
P. Melin
B. Michel
P. Nikiforuk
J. Perkins
B. Thompson
* E.B. Tinker

* Retired during 1982

EXECUTIVE OFFICERS OF THE COUNCIL'S STAFF

Executive Director	T.P. Pepper
Manager of Special Projects	J. L. Bergsteinsson
Administrative Officer	R.E. Melvin
Director of Financial Services	R. McGrath

Division Heads

Chemistry and Biology	E.M. Coxworth
Engineering	W.H.W. Husband
Geology	R.G. Arnold
Industrial Services	A. Scharf
Physics	J. Maybank

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PROCEEDINGS OF THE COUNCIL

There are at present, December 10th, 1982, 14 members of Council, four fewer than allowed by the Act. Terms of office of D. Patriquin, C. Blachford, A. Guy and W. Degelman expired during the year. Orders-in-Council reappointing or replacing these members are being processed. Council extends grateful thanks to those leaving for their contribution to its activities.

The Honourable Jack Sandberg replaced the Honourable Norman Vickar as Council Chairman.

Additional to the regular business of Council meetings which is to receive reports of the Executive Committee and the Executive Director and to formulate policy and program priorities, at its September 30th, 1982 meeting in Saskatoon, Council discussed and approved the Long Range Plan for the operation of its laboratories.

The Executive Committee, consisting of Council Chairman, Vice-Chairman, Secretary, B. Craig, L. Katz, with the Executive Director as Secretary, met four times during the year on March 23rd, July 12th, August 31st, and December 1st, 1982. The main activities of the Executive Committee were, in collaboration with Council Management, to prepare policy and major administrative program items for Council discussion.

EXECUTIVE DIRECTOR'S REPORT

While the current economic recession and the cancellation or deferment of many contracts have imposed involuntary restraints on SRC's operations, including an obviously more modest annual report, we at SRC can report positive achievements during 1982 and a new sense of purpose.

During the year Management finalized and Council approved a Long Range (five year) Plan for the operation of the laboratories.

It is a pleasure to acknowledge the contribution of staff, Council members and many others to the Long Range Plan. In particular, for their unstinting efforts, I wish to thank the Long Range Plan Planning Directorate consisting of Alan Scharf, chairman, and John Bergsteinsson, planning coordinator, and in addition Council liaison member, Doug Patriquin.

The Plan recommended major program and accompanying organizational changes. Emphasis has shifted from SRC as producer to the client as consumer of technology. This change resulted in replacing the traditional disciplinary structure with the following activity sectors: Resources, Industrial Technology Transfer, Environment, backed up with a roster of technical and administrative Services. Activity Sector Managers replace Division Heads. A number of specific projects and programs are identified for the next five years.

While prevailing economic conditions are slowing the implementation of the Long Range Plan, the following are some achievements in 1982:

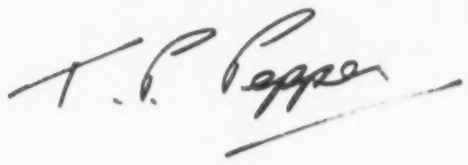
- On October 22nd, 1982, the Honourable Senator Hazen Argue and the Honourable Jack Sandberg representing the Federal and Provincial Governments officially opened the Canadian Centre for Advanced Instrumentation (CCAI) dedicated to providing instrumentation design, development, and service for the resource and high technology industries. The Centre will be supported by a grant of up to $200,000/year for five years from the Federal Department of Industry, Trade and Commerce, after which it is expected to be self-supporting.
- Preliminary research results indicate that intensive rainbow trout farming should be pursued as a profitable small industry in Saskatchewan.
- It is fitting during times of constraint that conservation projects be emphasized. This indeed has been the case at SRC as a result of significantly increased contract work for two programs. One is an agriculturally oriented program to increase energy conservation on the farm, to maximize the use of waste biomass, to increase crop productivity and to develop saline resistant crops. The other program is a nationwide study for the Department of Energy, Mines and Resources of low-rise residential energy conservation practices. For its work in energy conservation SRC shared with other Saskatchewan agencies a Conservation Housing Design Council Award of Merit. It is to be hoped that through SRC's efforts, Saskatchewan's construction and energy-efficient-components industries will become national leaders.

Since small, especially high technology, firms contribute above average to innovation, employment, productivity and exports, it is noteworthy that the value of SRC to small business becomes increasingly apparent during periods of economic restraint when financial resources limit in-house R&D and technical effectiveness become crucial for survival. This is demonstrated in the increased interest both in the NRC-supported Technical Information Service program and in the information and expertise resident at SRC.

Curtailment of some activities has resulted in almost 10% reduction of staff. For the second year however, our operations will exceed $10 million dollars. It is expected, as was the case last year, that less than 3% of contracts will be for greater than $100,000, while almost three quarters will be for jobs less than $1,000. Again it is expected that the

number of paying clients this year will exceed 500.

Because it has been a difficult year, it is especially gratifying to acknowledge the cooperation and performance of staff and support of Council, all of which has been first rate.



CHEMISTRY AND BIOLOGY DIVISION

Title	*Objectives*	*Milestones*
Carbon-14 or Radio-carbon Dating C-704-2	Determine the age of a material by measuring the decay of Carbon-14. Assist archaeologists, geologists, pedologists, etc. in their research.	Analyzed 175 samples, most of them supplied by the National Museum of Man.
Biofuels Research C-711	Determine whether farm grown diesel fuels can be developed for security of farm fuel supply. New markets for Saskatchewan farm products? Conduct applied research with fuels derived from whole plant oil crops and vegetable oil crops. Examine the nature and level of various exhaust gas components for canola oil and its methyl ester derivative as compared to those derived from conventional diesel fuel, as well as the effect which these novel fuels have on the lubricating oil after extended fuel use.	Extension of project on showy milkweed (*Asclepias speciosa*), which started in 1980. Costs shared by Agriculture Canada's ERDAF program, Enersearch, and SRC. The project involved many sub-contracts and will continue for the next two years. Continuation of project to investigate canola oil as a diesel fuel substitute/extender (under Agriculture Canada's ERDAF program, in co-operation with the University of Saskatchewan's Agricultural Engineering Department and the POS Pilot Plant Corporation). Evaluation of *Lunaria* as a vegetable oil crop indicates it could be a rich source of either diesel fuel extender or high value industrial oil (in progress).
Biomass Production and Refining C-711-10 (Three-year funding program funded by Agriculture Canada)	Find: Higher yielding forages for saline areas. Methods for separating and processing these to yield high protein content feeds, liquid fuels, and other products. New markets for forages. Greater use of forages in crop rotations for feeding cattle. Study the use of alcohol extraction of forages to provide oil refinery feed stock, or as octane enhancers for gasoline.	Found one potential high yielding forage crop for saline soils: *Kochia*, a common wild plant. Found higher yielding varieties of slender wheat grass (in co-operation with Dr. Crowle of Agriculture Canada, Saskatoon Research Station). Progress made in the development of methods to break down the carbohydrate part into simple sugars (these would then be fermented to produce liquid fuels to run the farm system).
Farm Energy Management Program (three-year study funded by the provincial-federal joint agreement on energy conservation) C-711-14	Examine integrated methods to reduce the costs of farming associated with fuel, fertilizer, and other energy intensive factors. Provide assistance to save fuel in retrofitting houses.	Installed, with the co-operation of the farmers, fuel meters on all farm fuel storage tanks to report fuel use by equipment. Data to be analyzed by computer. Seminar to show the interrelation

Title	Objectives	Milestones
	Test new methods to improve the efficiency of use of fertilizers.	of the different aspects of farms and the use of energy.
	Assess methods of working fields to improve efficiency use of field equipment.	Seminar also demonstrated how to improve on the saving of energy with new cropping systems, crop rotation, minimum tillage, use of fertilizers, etc.
	Examine the energy saving implications of the new cropping systems and measure the effects of energy cost saving measures.	
Analytical Research C-803-2	Develop new analytical techniques and methodologies as required by client requests and to improve existing capabilities.	Development of new analytical techniques for the analysis of trace levels of pesticides and herbicides.
		Improvement of analytical techniques in the analysis of acid rain and acid snow.
		Development of neutron activation analysis methods for gold, uranium, thorium, arsenic and rare earths.
Analytical Services C-803-3	Perform chemical analysis of a wide range of industrial, environmental and research project samples.	Compared to last year's, the level of analytical services has risen and the work load in chromatographic analysis for trace herbicides, pesticides and other organic pollutants has been maintained.
		Faster determination of radiochemical constituents.
		Use of the Slowpoke reactor in neutron activation analyses for several studies.
Methoxychlor levels in sediments, invertebrates and fish in the Saskatchewan River System C-805-27	Determine the fate of Methoxychlor, used as blackfly larvicide, in the biota of Tobin Lake.	Verification of the fact that bioaccumulation does not persist in sediments from one year to the next (in progress).
	Establish whether midge larvae act as agents of transfer of Methoxychlor from the sediments to fish.	
Qu-Appelle Water Quality Study–Regina–Moose Jaw — Water Supply Study C-805-33	Provide additional water quality data to better evaluate the water supply alternatives.	Completed second season of sampling and analyses of Lake Diefenbaker, Qu'Appelle River and Buffalo Pound Lake waters and prepared report.
	Study: Phase I Investigations towards determining the most economical and feasible method of meeting the water supply needs for Regina, Moose Jaw and surrounding areas.	Water quality data available to members of Project Steering Committee.

Title	*Objectives*	*Milestones*
An Investigation of Pocket Gopher Distribution in Saskatchewan C-805-35	Establish pocket gopher densities in Saskatchewan: – to facilitate decision-making regarding placement of armoured fiber optics cable by Saskatchewan Telecommunications; – reduce damage to fiber optics cable.	Completed study. Density map has been accepted as a basis to select appropriate cable.
Nipawin Reservoir Heritage Study C-805-40	To mitigate the impact to archaeological resources resulting from the construction and operation of the Nipawin hydro-electric plant. To obtain information on the culture, history and lifestyle of the river valley occupants in the last 6,000 years or more.	In the second year of this program: – 27 new archaeological sites recorded; – exploratory work done at 64 sites; – exceptional amount of information obtained from sites used by the last prehistoric occupants of the valley (ca. A.D. 1400-1700); – the first excavation in northern Saskatchewan of buried campsite remains (3,000 and 4,000 years old); – located and slated for excavation buried occupations (5,000 years old); – nearly completed excavation at a fur trade post (1768-73); – completed excavation of a Hudson Bay establishment (ca. 1850).
Chemical aversion as a means of reducing black bear damage to beehives C-805-50	Determine the effectiveness of Thiobendazole in discouraging bears from damaging beehives. Experiment with bait preparation and placement.	Completed study on the chemical shows promising results.
Radio-nuclide Pathway Study C-806-12	Undertake studies of growth, fecundity, histopathology and parasitism of fish in Beaverlodge Lake to identify population differences possibly attributable to low level nuclear radiation.	Preliminary investigations show that fish carry fewer parasites than controls. Study in progress.
Improvements in Agricultural Residues for Ruminant Feed C-814-12	To provide producers with alternate, inexpensive feeds for maintaining pregnant cows throughout the winter, e.g. ammoniated chaff.	Assisted the Provincial government and several farmers to set up a demonstration experiment on the use of ammoniated straw or chaff for wintering cattle. One farmer developed a new system and new equipment for collecting chaff piles from the fields, treating them with ammonia and feeding the product to cattle.

Title	*Objectives*	*Milestones*
Improvement in the feed value of straw by treatment with potassium salts and/or calcium hydroxide C-814-13 (Funded by PCS)	Compare the improvement in digestibility of straw following treatment with a mixture of calcium hydroxide (lime) and potassium salts to the improvement observed after treatment with potassium hydroxide.	Significant improvement was noticed when straw was treated by either method.
	Produce potassium hydroxide in situ at a lower cost through a mixture of calcium hydroxide and a potassium salt. Could be useful in developing countries and provide a market for our potassium salts.	
	Confirm the effect of potassium and phosphorous added to calcium hydroxide-processed crop residues in the improvement of animal growth.	Still to be confirmed.

ENGINEERING DIVISION

Title	*Objectives*	*Milestones*
Development of Ceramics E-720-2	To find economic uses for the non-metallic minerals of Saskatchewan, clays in particular.	The cause of the poor behaviour of Saskatchewan stoneware clays in slip casting was found. It is simply soluble salts. A washing method was devised to correct the defect.
Transportation Engineering E-725	To provide planners and designers with a reliable data base to assess slurry pipelines as an alternative transportation mode. To provide industrial clients with specific pipelining expertise, test facilities, and in-plant assistance.	Completed a coarse coal-in-water slurry study. Investigated the possibility of pipelining oil sands from mine to plant. Determined the pipeline transport properties for a waxy shale oil. Started a program to determine transport properties for Saskatchewan heavy oils. Determined the pipe size requirements for underground stowage of potash tailings (with PCS).
Water Quality and Quantity E-820-5	To develop and provide expertise in environment monitoring in Saskatchewan. To undertake environmental assessments and studies of water and land resources using equipment, data and techniques developed by SRC.	Provided essential hydrological and remote sensing input to environmental impact studies in Saskatchewan. Developed effluent samplers, and water quality and quantity monitors for environmental regulatory bodies and uranium mining clients. Provided repair and service facilities for satellite retransmission recorders used in environmental studies.
Humboldt Aquatic Plant Demonstration E-820-13	To develop an inexpensive technology to treat sewage in small communities.	Development of a technique to treat anaerobic and aerated sewage using aquatic plants in shallow lagoons or ditches. Establishment of design parameters with construction and operational procedures. Evaluation of the operation of a continuous flow system.
Lake Rehabilitation at Humboldt E-820-22	To evaluate the input, storage and release of phosphorous and nitrogen in Stoney Lake at Humboldt.	Analysis of water and sediment samples to determine their nutrient exchange characteristics.

Title	Objectives	Milestones
	To develop management guidelines to restore the water quality in the lake.	Development of a tentative interpretation of the data.
Loss of Nitrogen in Animal Manure E-820-27	To understand the ways in which nitrogen is lost from swine manure slurry under aerobic and anaerobic storage conditions. To develop inexpensive methods to conserve nitrogen during storage and after disposal on land.	Obtained preliminary data on the loss of nitrogen as a function of temperature, pH, volatile solids and carbon content. Evaluation of reliability of data for valid interpretation.
Energy Conservation E-825	Research, development and technology transfer related to residential energy conservation.	23 reports on residential energy conservation issued under the Building Technology Support Program. Secured federal contracts to write national guidelines on the installation of insulated sheathings and sidings, and on the use of ventilation systems as remedial measures in houses with formaldehyde problems. Conducted performance tests on two energy conservation devices manufactured in Saskatchewan, and reports have been submitted to the manufacturers. 200 homeowners and builders have received advice, inspection services and problem diagnoses at no cost. This service helps homeowners and builders avoid nearly a million dollars' worth of potential structural damage every year.
Industrial Development E-830	Technical support for the development of new and improved industrial products and processes in Saskatchewan. Production of stress cells. Projects in the areas of thermal energy storage and sodium sulphate production.	Assessment of the use of dolomite as a substitute for lime in neutralizing uranium tailings (in progress). Production of stress cells for use in potash mines (continuing). Study of the simultaneous liquefaction and transport of lignite coal (completed). Completed several projects in the areas of thermal energy storage and sodium sulphate production.

Title	*Objectives*	*Milestones*
		Literature study on the removal of PCBs from soil (continuing).
Resources Process Development E-835	Technological assistance for the optimum development of Saskatchewan resources.	Completed field work on a long term study of water desalination using natural refrigeration.

GEOLOGY DIVISION

Title	*Objectives*	*Milestones*
Lithogeochemistry G-740	Study the behaviour of major and trace elements during geological processes, in particular during hydrothermal alteration events related to the formation of mineral deposits. Investigate approaches to the effective statistical analysis of lithogeochemical data, using multi-variate data analysis methods. Develop a methodology for the application of lithogeochemistry to mineral exploration, making use of the core work as explained above.	Development of general approach to the study of major and trace element behaviour based on: – the recognition of particular factors controlling the behaviour of each group of elements; – the integration of geological information with analytical data; – the use of flexible descriptive data analysis techniques. Development of support computer system combining the storage capability, power and speed of a main-frame computer with the specialization and flexibility of a stand-alone graphics work station. Professional development seminar for mineral exploration companies to communicate the developed methodology.
Geochemical Analysis Laboratory G-742-2 (Service)	Provide geochemical analysis of rocks, minerals, soils and ores for the mineral deposits research programs and for external customers (mainly mining exploration companies).	Revenue earned might reach $300,000 by April 1983, mainly through the analysis of rocks and ores in the form of drill core for mining companies.
X-Ray Diffraction Clay Analysis Laboratory G-742-3	Identify clay and other minerals and measure their relative concentrations in drill core from uranium exploration programs and heavy oil development projects.	Revenue earned from internal SRC research projects and from uranium and oil industries might total $150,000.
Graphics Services G-742-8	Provide a complete cartographic, photomechanical and graphics service to SRC, government and industry. Maintain updated base map, topographic map, aerial photograph and mosaic libraries to support resource and environmental research projects.	In progress.
Quaternary Geology G-743-2	Map, describe and analyse glacial and recent sediments deposited during the Quaternary period and study the processes that formed the sediments and landforms in Saskatchewan.	Complete a major evaluation of the geology and groundwater resources of the Hatfield Valley Aquifer in the Melville region (Canada-Saskatchewan Interim Subsidiary Agreement on Water

Title	*Objectives*	*Milestones*
	Apply geology to geotechnical problems and to the evaluation of groundwater and aggregate resources in the plains region.	Development for Regional Economic Expansion and Drought Proofing).
		Completed a study of recent glacial sediments, landforms and glacial history of the area west of Wollaston Lake (National Energy Agency-International Atomic Energy Agency research program on uranium exploration methods).
		Completed a study of sediments, landforms and history of glacial Lake Agassiz in Saskatchewan (Geological Association of Canada-Lake Agassiz Symposium).
		Completed 70 percent of the compilation of the geology for the 1:1 million Quaternary map of Saskatchewan.
Aggregate Resources of Saskatchewan G-743-7	Inventory of the aggregate resources of Saskatchewan plains in terms of location, extent, quantity, quality and characteristics as an aid to local and regional development.	Review of aggregate resource evaluation programs in other provinces.
		Development of a program to map and evaluate Saskatchewan aggregate resources in Saskatchewan.
		Preliminary Sand and Gravel Resource Maps have been compiled.
		Presentation of maps and inventory rationale at Saskatchewan Geological Survey meeting.
Evaluation and Monitoring of Groundwater Resources G-744-2	Determine the location of aquifers in the plains region, assess their potential yield and the quality of the groundwater.	Completed three reports: two of the Hatfield Valley aquifer system — Wynyard and Waterhen regions — and a third on a computer model for the Estevan Valley aquifer system (Canada-Saskatchewan Interim Subsidiary Agreement on Water Development for Regional Economic Expansion and Drought Proofing).
	Monitor groundwater-level fluctuations due to climatic variability to study groundwater regimes of aquifers.	Detailed analysis of well hydrographs in progress.
	Studies of groundwater contamination.	Completed studies on groundwater monitoring and a geophysics program around a potash mine waste disposal basin to study subsurface brine migration.

Title	Objectives	Milestones
	Transfer of information to both the private sector and government agencies.	Provided groundwater information and advice to private individuals, well drillers, engineering consultants, and government agencies.
Genesis and Exploration for Metallic Mineral Deposits G-745-2	Investigate how mineral deposits have formed in Precambrian terrains of Saskatchewan and formulate criteria to develop improved exploration strategies and assist in the discovery of new deposits.	Recognized the importance of basin evolution and diagenesis for the formation of mineral deposits in the Athabasca Basin. Developed metallogenetic model which now forms the conceptual framework for exploration in the Athabasca Basin. Demonstrated the diagnostic value of clay mineral alteration in identifying targets, and applied XRD clay mineral analysis as a tool in uranium exploration. Paper on Clay Mineral Diagenesis and Uranium Mineralization in the Middle Proterozoic Athabasca Basin, Saskatchewan" was presented at a Royal Geological Society meeting in London, England. Paper on new theories on metallogenic history of the Uranium City area and on its potential for mineral deposits other than uranium, was presented at a Saskatchewan Geological Survey meeting attended by 200 participants from industry.

INDUSTRIAL SERVICES DIVISION

Title	*Objectives*	*Milestones*
Technical Inquiries	Provide technological information, advice and assistance to manufacturing firms in the province.	842 plants visited. 1211 inquiries handled.
Industrial Engineering	Provide advice on methods of improving production operations, implementing and developing new processes, products and markets, and reducing costs and increasing profits. Keep manufacturers informed on new technological developments and innovations, recent scientific research results, on properties and processing of materials pertinent to their needs.	260 clients served. 81 new clients. 173 cases completed. 131 jobs created or saved. $1,790,000 sales increase. $205,000 reduced operating costs. $765,000 reduced capital investment.
Contributions to firms employing students	Administer the dissemination of funds supplied by the National Research Council under the Student Projects Program. Technology Transfer assistance to manufacturing firms by employing scientific or technical students. Assist in student selection and provide guidance and direct supervision to students.	32 student projects completed.
Contributions to laboratory investigations	Assist manufacturers in determining the necessary research to be undertaken and in locating the appropriate institution to conduct this work.	On-going consultation.
Small Computers	Establish a computer referral centre for small business.	Completed a 20-minute video cassette production on computers and their application to small business.
CAD/CAM	Transfer CAD/CAM technology to Saskatchewan industry.	Formation of a CAD/CAM steering committee from four industry segments, the Federal and Provincial governments and the universities. Five meetings held.
Industrial Business Management	Assist through publications in the technology transfer to businesses and other organizations in Saskatchewan.	Nine articles published.

Title	*Objectives*	*Milestones*
Seminar Development	Provide through seminars intensive training in subject areas where specific needs have been identified.	Two new seminars: a – Project Management; b – Purchasing and Inventory Control.
Productivity Study	Conduct a literature survey and a study of various issues related to productivity.	
Decision Analysis	Develop expertise in the use of the Decision Analysis techniques.	Assistance provided to a Crown Corporation in a significant R&D decision using this technique.
Small Business Assistance Study	Survey of small businesses in the province to assemble an inventory on assistance presently available to them and to assess their needs. Provide recommendations based on the findings of the survey.	Report published.
Technology and Management Skills Transfer	Assist Saskatchewan businesses with technical and management skills. Provide intensive training in identified problem areas like Production Management, Index Trial Supervision, Time Management, Market Planning, etc.	Thirteen public and in-house seminars conducted.
New Product Development Assistance	Provide management assistance in the area of new product development to a Saskatchewan resource company.	Project completed.
General Management Assistance	Provide assistance to a farm implement manufacturer.	Project completed.
Productivity Facilitator Services	Provide services to a government department in the re-design of their advance account management system.	Project completed.
Market Research Study	Conduct study to assess the effectiveness of an advertising program for a large co-operative.	Project completed.
Financial Analysis Study	Carry out a study of revenues and expenditures of Saskatchewan urban municipalities.	Project completed.
Organization and Administration Study	Conduct study for a provincial service organization.	Project completed.

Title	*Objectives*	*Milestones*	
Word Processing	Conduct an assessment of the word processing needs of a government agency.	Project completed.	
Market Study	Carry out a market study. Prepare a feasibility report on the establishment of a centre for advanced technology in Saskatchewan.	Centre was established.	
Retail Development Study	Conduct study for a large retail co-operative.	Project completed.	
Retail Space Requirement Study	Conduct study for a city government.	Project completed.	
Preliminary Feasibility Study	Conduct study for the establishment of a plated through printed circuit board manufacturing plant.	Project completed.	
General Management and Restructuring Assistance	Provide assistance to a major Saskatchewan farm implement manufacturer.	Project completed.	
Marketing Research Study	Conduct study to assess consumer attitudes toward pension plans for a provincial pension society.	Project completed.	
Training Program	Conduct assessment on a program implemented by a provincial government department.	Project completed.	
		Projects completed	*Estimated development costs saved*
Product Analysis I	Computer simulation predicting performance of a new product prior to building. Analysis results used by company to finalize design of new product — reduces field testing and production lead time.	9	$290,000.00
New Technology Development	These projects are used to develop our skill and expand our services into new areas.	Conducted a review of state-of-the-art in CAD/CAM technology. Conducted a symposium on CAD/CAM for Saskatchewan manufacturers.	
Prepare for Manufacture	Assist company in detail — a product now being developed.	5	25,000.00

Title	*Objectives*	*Milestones*	
		Projects completed	*Estimated development costs saved*
Product Analysis II	Computer simulation of existing product to solve performance problems.	3	40,000.00
Product Engineering I	Redesign of existing product or process to meet technical requirements.	3	75,000.00
Systems Engineering	Assist company in computerization of operations.	2	50,000.00

PHYSICS DIVISION

Title	*Objectives*	*Milestones*
Atmospheric Emission and Dispersion Studies P-780	Help resource and manufacturing industries meet environmental quality goals through studies of air pollution processes within the province.	Operation of regional network of herbicide monitoring stations. Report on acid deposition prospect for Northern Saskatchewan; extended in a second report to adjacent N.W.T. areas. Survey on deposition of acid materials on snow in Northern Saskatchewan during the winter of 1981-82 (for Department of Environment). Stack emission investigations done under contract for provincial firms (mostly potash mines).
Industrial Hygiene P-781	Investigate the quality of the workplace environment to recognize, evaluate and control potential hazards in Saskatchewan industries, in cooperation with medical authorities.	Report on ingestion and inhalation levels for Saskatchewan farmers when spraying herbicide (with the U of S, Department of Social and Preventive Medicine). Measurement of asbestos particle concentration in buildings, sports arenas, etc. Contract with AECB for investigation of radioactive dusts in uranium open-pit mining equipment.
Computer Systems and Resource Data Bases P-782	Maintain basic computer files on coal quality and ground water hydrology. Develop a graphics computer system and identify practical applications. Undertake data processing contract work.	Assessment of computer needs and ways to meet these needs for the Prairie Agricultural Machinery Institute. Analysis of farm field land conditions by computer graphics techniques and aerial photographs. Work on geological exploration sites to computerize and document physical parameters of the sites. Information retrieval system for slurry pipeline research literature.
Geophysical and Design Services P-783	Publication of technical material related to SRC scientific studies and communication of scientific and technological information using graphical methods. Undertake applied projects related to groundwater geophysics.	Preparation and delivery of a three-day instructional course on geophysical logging of water wells for Saskatchewan Water Well Association. Report on implications for groundwater levels of a rain enhancement program.

Title	*Objectives*	*Milestones*
		Designed and produced promotional and extension materials for a farm energy management program.
Canadian Centre for Advanced Instrumentation (CCAI) P-795	Provide electronic and instrument expertise to SRC's research activities. Design under contract specific devices to meet a client's needs. Investigate the potential marketability of such instruments, and negotiate the subsequent manufacture under license of the most promising ones. Provide servicing capabilities for specialized instruments.	Formal establishment of the Centre. Contract on design and construction of an automated air sampling and analysis system. Design, construction and installation of a special water level monitoring system for the Sylvan Lake area in Alberta. Preliminary feasibility studies for the potential use of microprocessors by small Saskatchewan industries. Electronics service and maintenance facility for provincial clients.
P-799	To provide support for new, preliminary investigations.	
Applied Climatology P-784	Maintain a basic capability to investigate climatological problems of interest to Saskatchewan. Make specialized climatological measurements not normally part of a basic climatological program.	Completed the field measurement phase of a contract for SaskOil respecting the use of wind power for pumping oil. Collaborated with the Department of Tourism & Renewable Resources on a project for the location of lightning by electronic detection. Maintained climatic data files and operated a climatological benchmark station.

PUBLICATIONS

Industrial Services Division

Making Workshop Teams Effective, A. Scharf. August, 1982. SRC Publication No. I-4100-9-D-82.

How to Expand Functions, A. Scharf. October, 1982. SRC Publication No. I-4100-10-D-82.

A Proposal for Industrial Seminars : Managing Success — An Approach to Survival, A. Scharf. October, 1982. SRC Publication No. I-4100-11-F-82.

Time Management, A. Scharf. April, 1982. SRC Publication No. I-4100-1-D-82.

Getting the Job Done In Time, A. Scharf. May, 1982. SRC Publication No. I-4100-2-D-82.

Time Management, A. Scharf. June, 1982. SRC Publication No. I-4100-3-D-82.

Proposal for a Review of the Financial and Administrative Services of the Prince Albert District of the Canadian Department of Indian and Northern Affairs, A. Scharf. June, 1982. SRC Publication No. I-4100-4-F-82.

General Principles for Economic Community Growth — Pocket Card, A. Scharf. July, 1982. SRC Publication No. I-4100-5-G-82.

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New Data Acquisition System for PAMI, T. Locke and J.H. Dyck. March, 1982. SRC Publication No. P-782-1-C-82.

Applications of a Data Tablet Digitizer, J.H. Dyck, R.D. Reich, C.T. McKenzie. August, 1982. SRC Publication No. P-782-2-E-82.

Streamed Information System II, Charles McKenzie. September, 1982. SRC Publication No. P-782-3-E-82.

Digitizer Applications, J.H. Dyck, R.D. Reich, C.T. McKenzie. September, 1982. SRC Publication No. P-782-4-G-82.

Assessment of Precipitation Enhancement on Groundwater in Saskatchewan Crop District Areas 1A, 3B-S, and 4A,

H. Maathuis and J.H. Dyck. January, 1982. SRC Publication No. P-783-1-B-82 (also SRC Technical Report No. 121).

Estimates of Annual Precipitation and Evaporation at Saskatoon, Saskatchewan, J.L. Bergsteinsson. March, 1982. SRC Publication No. P-784-1-C-82.

Climatological Reference Station: Annual Summary, 1981, J.L. Bergsteinsson, J.G. Calvert. September, 1982. SRC Publication No. P-784-2-B-82 (also SRC Technical Report No. 132).

Operator's Manual for Model EL-105 Temperature Integrator, D.B. Barnett. January, 1982. SRC Publication No. P-793-1-E-82.

Rain Gauge and Recording System Feasibility Study, T. Locke. November, 1982. SRC Publication No. P-795-9-E-82.

Preliminary Feasibility Study for a PC Board Manufacturing Facility in Saskatchewan, Ravi Maithel and Don Barnett. July, 1982. SRC Publication No. P-795-1-B-82 (also SRC Technical Report No. 130).

Research Proposal for Development of a Data Recording Device for Distribution System Applications, Terry Locke, Don Barnett, Gary Beeton. August, 1982. SRC Publication No. P-795-2-F-82.

Magnetic Susceptibility Meter Feasibility Study, Terry Locke and Gary Beeton. August, 1982. SRC Publication No. P-795-3-E-82.

Proposal for Feasibility Study for Seeding Machine Using a Microprocessor Based Controller, D.B. Barnett. September, 1982. SRC Publication No. P-795-4-F-82.

Research Proposal for a Feasibility Study to Investigate the Development of a Field Sprayer for Agricultural Use, D.B. Barnett. October, 1982. SRC Publication No. P-795-5-F-82.

Research Proposal for a Feasibility Study to Automate the Fabrication of Counter Tops, D.B. Barnett. October, 1982. SRC Publication No. P-795-6-F-82.

Canadian Centre for Advanced Instrumentation Progress Report, D.B. Barnett. October, 1982. SRC Publication No. P-795-7-E-82.

Research Proposal for a Feasibility Study to Incorporate an Electronic Forage Crop Weight Monitoring Device for Plot Harvesters Manufactured by Swift Machine and Welding Ltd., D. Barnett. November, 1982. SRC Publication No. P-795-8-F-82.

Scholarships

The Government of the Province of Saskatchewan offers graduate research scholarships, tenable at either the University of Saskatchewan or the University of Regina. The purposes of the awards are to assist graduate students to prepare for careers in scientific and industrial research, and to create interest in the exploitation of Saskatchewan's resources and in techniques that will advance the development of the Province. SRC conducts the selection of the candidates.

Awards valued at $7,200 for the year beginning May 1, 1982 were made to:

Angela M. Congram, Geology Department
University of Saskatchewan

Frederick Frankling, Plant Ecology Department
University of Saskatchewan

Margaret K. Lomas, Geological Sciences Department
University of Saskatchewan.

Grants-In-Aid

Since its creation in 1947, the Saskatchewan Research Council has provided grants to applicants in Saskatchewan Universities for applied research in the sciences. Eighteen grants totalling approximately $115,100 were awarded in 1982 to applicants at both the University of Saskatchewan and the University of Regina.

The following projects are presently receiving support under the grants-in-aid program:

UNIVERSITY OF REGINA

Department of Biology
Morphological and biochemical studies on induction of dormancy in developing caryopses of avena fatua (wild oat)
under the direction of Professors M.V.S. Raju and W.A. Quick.

Department of Chemistry
Electrochemical gasification of coal
under the direction of Professor K.E. Johnson
The removal of sulfur compounds from crude oil by oxidative methods
under the direction of Professor D.G. Lee.

Department of Engineering
Modelling transportation energy in subdivisions
under the direction of Professor F.A. Curtis.

Department of Geology
Trace elements (particularly base metals of economic interest) in the Flin Flon volcanics
under the direction of Professor G.R. Parslow.

UNIVERSITY OF SASKATCHEWAN

Department of Agricultural Engineering
Artificial recharge of groundwater
under the direction of Professors J.A. Gillies and J.M. Murray.

Department of Civil Engineering
Using absorptive paper to measure matric suction for swelling and seepage problems in unsaturated soils
under the direction of Professor D.G. Fredlund.
The development of a methodology to provide an alternative to present groundwater control around open pit uranium mines
under the direction of Professor M.D. Haug.
Hydrogeology of till deposits in Saskatchewan
under the direction of Professor E.K. Sauer.

Department of Crop Science
The kinetics of ice formation in winter wheat tissue
under the direction of Professor L.V. Gusta.
Techniques for use of legumes to improve soil nitrogen
under the direction of Professor L.A. McLean.

Department of Dairy and Food Science
Production of ethanol and other liquid fuels from biomass by syntrophic fermentation
under the direction of Professors G.A. Jones, W.M. Ingledew and G.G. Khachatourians.

Department of Geology
Geochemical studies of Flin Flon volcanics
under the direction of Professors L.C. Coleman, E.G. Nisbet and M.R. Stauffer.

Department of Horticulture Science
Reproductive and vegetative phenology of Saskatoon berry, Amelanchier alnifolia nutt
under the direction of Professor C. Stushnoff.

Department of Physics
The development of the magnetotelluric method for resource exploration in Saskatchewan
under the direction of Professor K.V. Paulson.

Department of Plant Ecology
Modelling wheat growth and development
under the direction of Professor E.A. Ripley.
Ecological studies of the Lake Athabasca sand dunes in Saskatchewan
under the direction of Professor J.S. Rowe.

Department of Soil Science
The nature and properties of current and potential acidity of soils in Saskatchewan
under the direction of Professor P.M. Huang.

Staff of the Saskatchewan Research Council

Dr. T.P. Pepper	B.A., M.A., Ph.D. — Executive Director

Administration Division

Melvin, R.E.	B.E., PEng. — Administrative Officer	Koolick, P.	
		Kosteniuk, K.	
McGrath, R.J.	B.Sc., M.B.A., R.I.A. — Director of Financial Services	Limet, M.	
		Lutz, M.	
		MacEwan, A.	
Barabas, A.M.		Makohoniuk, M.	
Bowers, M.		Mangatal, S.	
Calderon, G.		McNeill, B.	
Carr, M.	B.A. M.L.S.	Millhouse, M.	
Collins, D.		*Nelson, K.	
*Criton, L.		Ottmann, A.	
DeGirolamo, M.		*Paulson, W.	
Diduck, D.		Pavelich, V.	
Erickson, B.	B.A.	Peters, J.	
Fidgett, R.B.		Popoff, F.	
Gilroy, B.		Rielkoff, W.	
Goran, B.		Samms, M.	Lib. Tech.
Grimsen, A.		*Syrjanen, C.	
Hickerson, V.		*Waywood, B.	
*Ives, D.		Weber, B.	
Janzen, L.		Weegar, E.L.	
Johnston, M.		*Wildey, D.	
Jones, L.		Will, M.P.	B.Ed.

Special Projects Unit

Bergsteinsson, J.L.	B.A., B.Sc., B.Ed. — Manager of Special Projects	*Calvert, H.	B.A.
		Cody, B.	B.A., M.A.
		Fothergill, D.	B.A.

Chemistry and Biology Division

Coxworth, E.C.	B.A., M.A., Ph.D. — Head	Didur, L.	
		Drader, G.	Chem. Tech.
Abouguendia, Z.	B.Sc., M.Sc.	Duff, T.	Lab. Tech.
Adolph, P.		Ediz, S.	B.Sc., M.Sc., Ph.D.
Bailey, C.S.	Lab. Tech.	Fahri, M.	B.Sc.
Barclay, R.	B.Sc.	Ferris, W.	B.A.
*Baschak, L.		Finnigan, J.	B.A., M.A.
Beaulieu, C.	B.A.	Forsythe, C.	Chem. Tech.
Brosseau, J.	B.Sc., M.Sc., Ph.D.	Gimby, M.	Dip. Agr.
*Burley, D.	B.A., M.A., Ph.D.	Godwin, R.C.	B.S.A.
*Chen, J.	B.Comm.	Hanna, M.	B.A., M.A., Ph.D.
Chorney, D.	Chem. Tech.	Hargrave, S.	
Craig, W.		Horechka, M.	
Darrach, W.A.		Jackson, L.	B.Sc.

James, D.	B.Agric.
Kernan, J.A.	B.Sc., M.Sc.
*Kha, L.	
Khosla, I.	
*Kilduff, B.	
Klassen, B.	Chem. Tech.
Klimko, O.	B.A., B.Ed.
Knelson, M.	Chem. Tech.
Kullman, P.	
Kwan, W.	Chem. Tech.
Lane, F.	Chem. Tech.
Ma, J.	B.Sc.
MacDonald, L.A.	
Magon, S.	
Maier, M.	Bio.Sc. Cert.
Marshall, H.	B.Sc., M.Sc., Ph.D.
Meyer, D.	B.A., M.A., Ph.D.
Moser, P.	Chem. Tech.
McKeand, P.	B.A.
Nemeth, L.	
Oro, F.	B.Sc., M.Sc.
Ortlepp, R.	
Paquin, B.	R.R. Tech.
Penner, V.	
*Pipe, A.	B.Sc., M.Sc., Ph.D.
*Pohorecky, Y.	B.Sc.
Poison, J.	B.Sc.
Prentice, J.	B.A.
Punani, S.	B.Sc., M.Sc.
Rasmussen, R.	R.R. Tech.
Reid, L.	B.Sc.
Richert, D.	R.R. Tech.
Rickard, C.	R.R. Tech.
Russel, D.	B.A., M.A.
Rutherford, A.	B.E., M.Sc.
Rutherford, L.	B.Ed., Chem. Tech.
Sawchyn, W.W.	B.A., M.A., Ph.D.
Schaffer, R.	
Sharma, V.	B.A.
Smithson, G.	B.Sc., M.Sc., Ph.D., PEng.
Sosulski, K.	M.Sc., Ph.D.
Swanson, S.	B.Sc., Ph.D.
Tanioka, K.	
Tones, P.	B.S.A., M.Sc., Ph.D.
Ty, L.	B.Sc.
*Valby, J.	B.A., M.A.
Waldal, C.	Chem. Tech.
Wilson, J.S.	B.A., M.A.
Wittenberg, J.	
*Wong, J.	B.Sc.
Woytowich, G.	
Yuen, W.	B.Sc., Ph.D.

Engineering Division

Husband, W.H.W.	B.A.Sc., M.B.A., M.Sc. Ph.D., PEng. — Head
*Bais, D.	
Barnes, W.B.	B.E., PEng.
Bindle, K.	
Bouvier, R.	
*Brown, G.	
*Coroy, G.	
Davidson, R.	B.Ed.
*DeGirolamo, M.	
*Didur, D.	W.Sc. Tech.
Eyre, D.	B.Sc., M.Inst.P.
Filson, H.	B.E., M.Sc., PEng.
*Gerbrandt, S.	
Gillies, R.	B.E., M.Sc., PEng.
Gleadhill, M.	
*Green, M.	B.Ed.
Haas, D.	B.E., M.Sc., PEng.
Hudson, J.	B.A., M.A.
Hunt, G.	B.A., M.A., B.Ed.
Jahren, R.	R.R. Tech.
Jennings, D.R.G.	
Jones, J.T.	B.A., I.Tech.
*Kohle, D.	
Lakshman, G.	B.Sc., M.Sc.
Lehtinen, J.	B.A., B.Sc.
Lychak, J.	
MacPherson, R.J.	
Marshall, B.	
McEwan, D.	
*McGillivray, D.	
McKnight, R.	
Meginbir, G.A.	B.A.
Nicolichuk, N.	Civ.Eng.Tech.
Niyazi, S.	
Opsal, J.O.	B.Sc., PEng.
*Ostwald, W., Jr.	
Owens, K.A.	
*Peters, R.	
Schergevitch, P.	
*Shepherd, I.	
*Siminoff, P.	Chem. Tech.
Small, M.	Chem. Tech.
Smith, B.J.	
Spyker, J.W.	B.E., M.Sc., PEng.
Sulatisky, M.	M.Sc., Ph.D.
Thomanek, W.	B.Sc.
*Vertiska, Z.	
Voth, T.	
*Wall, T.	
Wheaton, E.	B.Sc., M.Sc.
Whiting, J.M.	B.Sc., M.Sc.
*Willick, J.	Elec.Const.Tech.
*Wolf, R.	
Wong, R.	B.E., PEng.
Woods, D.	Elec.Eng.Tech.
Wright, J.	

Geology Division

Arnold, R.G.	B.Sc., M.Sc., Ph.D. — Head	McKay, T.	Chem. Tech.
Archibald, P.		Mellinger, M.	B.Sc., M.A.Sc., Doc.Spec.
Bell, B.		Piek, H.	
Bilewski, Z.		Quirt, D.	B.A.Sc., M.A.Sc.
Campbell, J.	B.Sc., B.A.	Rackel, J.	
Cutts, S.		*Rawsthorn, K.	B.Sc.
Gartner, B.J.		Ross, W.C.	B.Sc.
Hoeve, J.	B.Sc., M.Sc., Ph.D.	Sardinha, C.	C.C.
Holsten, A.	B.Sc.	Schreiner, B.T.	B.Sc., M.Sc., P.Eng.
*Hudson, D.R.		Simpson, M.	B.A.
Jackson, A.		Smith, J.W.J.	B.Sc.
Jaworski, E.J.	R.R. Tech.	Sopher, L.	B.Ed.
Johnson, M.		Taylor, W.E.	C.C., CASI
Luc, S.		Turple, L.	B.Sc.
Maathuis, H.	B.Sc., M.Sc.	van der Kamp, G.	B.Sc., M.Sc., Ph.D.
McIntosh, B.	C.C.	Zlipko, D.	

Physics Division

Maybank, J.	B.Sc., M.Sc., Ph.D. — Head	Olm, O.	
		Ostwald, W.	
Barnett, D.	NBTI	Perkins, E.H.	Civ. Tech.
Beeton, G.	B.E.	Peters, M.L.	
Begrand, R.	B.Sc.	Pinchbeck, R.	
Calvert, J.		Reich, R.D.	Arch. Tech.
Dyck, J.H.	B.E., B.Sc., Ph.D., P.Eng.	Ross, W.H.	B.Sc., M.Sc.
Heinze, R.		Ross, J.	
Locke, T.	B.Sc., M.Sc., P.Eng.	Shewchuk, S.R.	B.Sc., M.Sc., Ph.D.
*Lofvendahl, J.		Wallace, K.W.	B.Sc.
Matieshin, R.T.		Yoshida, K.	B.Sc., Ph.D.
McKenzie, C.T.	B.Sc., M.B.A., P.Eng.	Young, K.	B.Sc., Elec. Tech.

Industrial Services Division

Scharf, A.	B.Sc., P.Eng., C.M.C. — Head	Karsan, A.	B.Sc. P.Eng.
		Kuchinka, C.	B.E., P.Eng.
*Canete, R.	B.Sc.	Levesque, R.	B.E., P.Eng.
Chan, R.	B.A.Sc., P.Eng.	Maithel, R.	B.Sc., M.Sc., P.Eng.
Cooke, G.	B.Sc., P.Eng.	Malinoski, A.	B.E., B.Sc.
Dziad, C.	B.A., B.Comm.	Pierce, G.	B.Sc., M.Sc., P.Eng.
Florizone, D.	Mech. Eng. Tech.	*Prokopetz, S.	
Glossop, D.	L.M.I., P.Eng.	Rawa, A.R.	B.Sc., P.Eng.
Grier, D.	B.E., B.Sc., P.Eng.	*Strelic, M.	B.Comm.
Jahren, C.	B.A.	Zuk, B.	B.E., B.A., P.Eng.

*Terminated employment during 1982.

Auditor's Report

To the Members of the Legislative Assembly
Province of Saskatchewan

I have examined the balance sheet of the Saskatchewan Research Council Fund as at March 31, 1982 and the statements of revenue, expenditure and fund balance, and changes in financial position for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Fund as at March 31, 1982 and the results of its operations and the changes in its financial position for the year then ended in accordance with the stated accounting policies applied on a basis consistent with that of the preceding year.

Regina, Saskatchewan,
June 10, 1982

W. G. Lutz, F.C.A.,
Provincial Auditor

SASKATCHEWAN RESEARCH COUNCIL FUND

BALANCE SHEET

MARCH 31

	1982	1981
ASSETS		
Current:		
Investments, at cost which approximates market value	$ —	$ 50,000
Accounts receivable	2,032,748	1,522,734
Prepaid expenses	27,793	45,070
	2,060,541	1,617,804
Other assets	3,933	3,820
Fixed assets (Notes 1(b) & 3)	1,815,995	1,636,400
	$3,880,469	$3,258,024
LIABILITIES AND FUND BALANCE		
Current:		
Bank indebtedness	$ 756,185	$ 238,811
Research grants payable	91,817	44,625
Accounts payable	590,844	295,929
Employee deductions payable	186,800	144,003
Retroactive salaries payable	43,395	—
Deferred revenue (Note 5)	103,840	121,117
Current portion of condition sales contract (Note 4)	82,020	73,232
	1,854,901	917,717
Long term:		
Conditional sales contract (Note 4)	194,748	276,768
Deferred revenue (Note 5)	545,627	634,942
Fund balance — Statement 2	1,285,193	1,428,597
	$3,880,469	$3,258,024

(See accompanying notes to the financial statements)

SASKATCHEWAN RESEARCH COUNCIL FUND

STATEMENT OF REVENUE, EXPENDITURE AND FUND BALANCE

Year Ended March 31

	1982	1981
Revenue:		
Contracts	$ 6,686,611	$4,637,498
Grant — Government of Saskatchewan	3,065,300	2,728,000
Interest	138,529	33,199
Other (Note 5)	227,756	89,410
	10,118,196	7,488,107
Expenditure:		
Salaries	5,719,305	4,411,732
Employee benefits	510,487	381,213
Supplies and technical services	2,201,011	1,202,147
Other	925,950	779,538
Depreciation (Note 1(b))	503,429	446,854
Travel and vehicle operations	295,316	244,216
Research grants	106,102	67,129
	10,261,600	7,532,829
Excess of expenditure over revenue for the year	143,404	44,722
Fund balance, beginning of year	1,428,597	1,473,319
Fund balance, end of year — to Statement 1	$ 1,285,193	$1,428,597

(See accompanying notes to the financial statements)

SASKATCHEWAN RESEARCH COUNCIL FUND

STATEMENT OF CHANGES IN FINANCIAL POSITION

Year Ended March 31

	1982	1981
Source of funds:		
From operations		
Excess of expenditure over revenue	$(143,404)	$ (44,722)
Add (deduct) charges (credits) not involving a flow of funds:		
Depreciation	503,429	446,854
Amortization of deferred revenue	(89,315)	—
Loss on disposal of fixed assets	9,778	2,977
	280,488	405,109
Increase in conditional sales contract	—	276,768
Increase in deferred revenue	—	634,942
Total source of funds	280,488	1,316,819
Application of funds:		
Increase in other assets	113	—
Reduction of conditional sales contract	82,020	—
Purchase of fixed assets	692,802	1,020,225
Total application of funds	774,935	1,020,225
Increase (decrease) in working capital	(494,447)	296,594
Working capital — beginning of year	700,087	403,493
Working capital — end of year	$ 205,640	$ 700,087

(See accompanying notes to the financial statements)

NOTES TO THE FINANCIAL STATEMENTS

Year Ended march 31, 1982

1. **Summary of Accounting Policies**

(a) Revenue Recognition

Revenue from the majority of contract work is recognized on the percentage-of-completion method which recognizes revenue as a contract progresses. Unbilled revenues are accrued to year end for these contracts, while pre-billed revenues are classified as deferred revenue.

Revenue from analytical lab work, involving shorter term contracts without substantial outlays of direct costs, is recognized on a completed contract basis.

(b) Fixed Assets

The assets of the Council are initially recorded at cost, including labour, material and overhead for self constructed assets.

Depreciation is provided over the estimated useful lives of the assets on the following basis:

(i) Sum of the years digits method

Buildings	20 years
Leasehold improvements	5 years
Equipment	10 years

(ii) Declining balance method

Automotive	33 1/3%

(c) Pension Costs

The Council participates with its employees in a benefit based pension plan and in accordance with recommendations of the plan's actuary current service costs to the Council are charged to operations annually. Unfunded past service costs are being funded by the Council over a minimum of fifteen years and are being charged to operations accordingly.

(d) Research Grants

Research grants awarded annually by the Council to aid in funding approved research projects are charged to expenditure in the year in which costs are incurred on the projects.

(e) Occupancy Costs

Certain buildings have been built for the use of the Council by the Government of Saskatchewan at no cost to the Council. No provision for such costs is reflected in these financial statements.

2. **Pension Plan**

An actuarial study of the pension plan of the employees of the Saskatchewan Research Council carried out at the inception of the plan in May, 1974 indicated an unfunded liability of $88,613 representing the cost to the Council of providing full past service benefits to existing employees joining the plan. In accordance with the recommendation of the actuary, this liability is being funded over a fifteen year period with the balance of this liability at December 31, 1980 having been reduced to $56,284. As the result of a second actuarial valuation as at December 31, 1977 it was determined there was an additional unfunded liability related to past service costs in the amount of $403,559 which, again in accordance with the actuary's recommendation, is being funded over a fifteen year period. The balance of this second liability was reduced to $348,524 as at December 31, 1980.

The most recent actuarial valuation as at December 31, 1980 reported that, after allowance is

made for the remaining contributions required to fund the previously determined liabilities, the plan had an accrued surplus of $65,384 as at December 31, 1980. For each of the above valuations, the method used to determine the actuarial surplus or liability was the accrued benefit cost method.

The actuary has recommended and the Council has agreed to continue to contribute to the plan at a rate of 9.5% of earnings less the employer's required contributions under the Canada Pension Plan. In the actuary's opinion, this contribution rate will be adequate to meet the obligations for benefits to be earned for future service and to extinguish the unfunded liabilities previously determined over a minimum time period, in each case, of fifteen years.

The next actuarial valuation is to be performed as at December 31, 1983.

3. **Fixed Assets**

	1982			1981
	Cost	Accumulated Depreciation	Net Book Value	Net Book Value
Buildings	$ 563,973	$ 243,566	$ 320,407	$ 321,835
Leasehold improvements	402,006	348,084	53,922	95,667
Equipment	2,720,051	1,370,713	1,349,338	1,151,416
Automotive	266,812	185,484	81,328	56,482
Land	11,000	—	11,000	11,000
	$3,963,842	$2,147,847	$1,815,995	$1,636,400

4. **Conditional Sales Contract**

The Council has entered into a conditional sales contract with Atomic Energy of Canada Ltd. for the purchase of equipment in the amount of $401,305. The contract included a $51,305 down payment on July 1, 1980 and four annual instalments including interest at 12%. At March 31, 1982, the remaining instalments are as follows:

Due Date	Principal
July 1, 1982	$ 82,020
July 1, 1983	91,862
July 1, 1984	102,886
	$276,768
Less current portion	82,020
	$194,748

5. **Deferred Revenue**

The Council has deferred revenue of $634,942 from the Potash Corporation of Saskatchewan for prepaid rent of a pilot plant. The revenue is being reflected in the accounts by the sum of the years' digits method over the 10 year term of the agreement which commenced in the 1981/82 fiscal year. The current portion of this deferred revenue is $89,315 and is classified accordingly in the balance sheet while the amount of revenue included in revenue of the current year is $94,058 (1981 – nil).

6. **Related Party Transactions**

Related parties to the Council are Saskatchewan's Crown controlled departments, agencies and corporations. Transactions with these parties are recorded at normal market prices except for certain buildings built for the Saskatchewan Research Council's use by the Government of Saskatchewan at no cost to the Council as explained in Note 1(e).